WHAT IS CLAIMED IS:

1. A method for forming a supported palladium membrane used for hydrogen purification and production, comprising steps of:

providing a support;

filling said support with a metal;

electroless plating a palladium membrane on said support with a palladium salt solution; and

DC sputtering an additional palladium membrane further on said support.

- 2. The method according to claim 1 wherein said support is a porous stainless steel support.
- 3. The method according to claim 2 wherein said porous stainless steel support is prepared by steps of:

mechanically polishing said support by one of an abrasive paper and an ultrasonic vibration;

electro-polishing said support;

acid-washing said support with $8\sim10$ N HCl; and activating said support at $40\sim60^{\circ}$ C.

- 4. The method according to claim 1 wherein said metal is one selected from a group consisting of palladium, niobium, tantalum and a combination thereof.
- 5. The method according to claim 1 wherein said metal is a hydrogen permeable fine metal powder.
- 6. The method according to claim 5 wherein said metal powder is mixed with one of a palladium paste and a high temperature epoxy resin.
- 7. The method according to claim 1 further comprising a step of polishing said support after said metal filling step.
 - 8. The method according to claim 7 wherein said polishing step is

performed by an abrasive paper.

- 9. The method according to claim 1 wherein said palladium salt solution contains $4.2\sim5.4$ g/L Pd(NH₃)₄Cl₂, $60\sim74$ g/L EDTA, $600\sim700$ g/L NH₄OH and $0.32\sim0.4$ c.c./L NH₂NH₂.
- 10. The method according to claim 1 wherein said electroless plating is performed for 120~360 minutes.
- 11. The method according to claim 1 wherein said electroless plating is performed at $50\sim70^{\circ}$ C.
- 12. The method according to claim 1 wherein a target of said DC sputtering is 99~99.9% palladium.
- 13. The method according to claim 1 wherein said DC sputtering is performed under a vacuum pressure of $10^{-2} \sim 10^{-5}$ torr and a power input of $200\sim 500$ W at $25\sim 250$ °C.
- 14. The method according to claim 1 wherein said DC sputtering is performed for 60~120 minutes.
- 15. The method according to claim 1 wherein said palladium membrane has a thickness of 3~30 µm after said DC sputtering.
- 16. The method according to claim 1 further comprising a step of annealing said palladium membrane at 450~550 °C under a nitrogen atmosphere including 3~10% hydrogen for 4~8 hours.
- 17. A method for forming a supported palladium membrane used for hydrogen purification and production, comprising steps of:

providing a support;

filling said support with a metal; and

electroless plating a palladium membrane on said support with a palladium salt solution.

18. A method for forming a supported Pd/Ag membrane used for hydrogen purification and production, comprising steps of:

providing a support;

filling said support with a metal;

electroless plating a palladium membrane on said support with a palladium salt solution;

electroless plating a silver membrane on said support with a silver salt solution;

annealing said palladium membrane and said silver membrane to form a Pd/Ag membrane; and

DC sputtering an additional Pd/Ag membrane further on said support.

- 19. The method according to claim 18 wherein said support is a porous stainless steel support.
- 20. The method according to claim 19 wherein said porous stainless steel support is prepared by the steps of:

mechanically polishing said support by one of an abrasive paper and an ultrasonic vibration;

electro-polishing said support; acid-washing said support with 8~10 N HCl; and activating said support at 40~60°C.

- 21. The method according to claim 18 wherein said metal is one selected from a group consisting of palladium, niobium, tantalum and a combination thereof.
- 22. The method according to claim 18 wherein said metal is a hydrogen permeable fine metal powder.
 - 23. The method according to claim 22 wherein said metal powder is mixed

with one of a palladium paste and a high temperature epoxy resin.

- 24. The method according to claim 18 further comprising a step of polishing said support after said metal filling step.
- 25. The method according to claim 24 wherein said polishing step is performed by an abrasive paper.
- 26. The method according to claim 18 wherein said palladium salt solution contains 4.2~5.4 g/L Pd(NH₃)₄Cl₂, 60~74 g/L EDTA, 600~700 g/L NH₄OH and 0.32~0.4 c.c./L NH₂NH₂.
- 27. The method according to claim 18 wherein said silver salt solution contains 0.2~1 g/L AgNO₃, 60~74 g/L EDTA, 600~700 g/L NH₄OH and 0.32~0.4 c.c./L NH₂NH₂.
- 28. The method according to claim 18 wherein said electroless plating is performed at $50\sim70^{\circ}$ C.
- 29. The method according to claim 18 wherein a target of said DC sputtering is a Pd/Ag alloy with a weight composition ratio of 77/23~60/40.
- 30. The method according to claim 18 wherein said DC sputtering is performed under a vacuum pressure of $10^{-2} \sim 10^{-5}$ torr and a power input of $200 \sim 500 \text{ W}$ at $25 \sim 250 ^{\circ}\text{C}$.
- 31. The method according to claim 18 wherein said step of annealing said palladium membrane and said silver membrane is performed at 450~550°C under a nitrogen atmosphere including 3~10% hydrogen for 4~8 hours.
- 32. The method according to claim 18 wherein said palladium membrane has a thickness of 3~30 µm after said DC sputtering.
- 33. A method for forming a supported Pd/Ag membrane used for hydrogen purification and production, comprising steps of:

providing a support;

filling said support with a metal;

electroless plating a palladium membrane on said support with a palladium salt solution;

electroless plating a silver membrane on said support with a silver salt solution; and

annealing said palladium membrane and said silver membrane to form a Pd/Ag membrane.